TABLE 1.—*Free-air temperatures, relative humidities, and vapor pressures during June, 1928*—Continued

RELATIVE HUMIDITY (%)

Altitude m. s. l. (meters)	Broken Arrow, Okla. (233 meters)		Due West, S. C. (217 meters)		Ellendale, N. Dak. (444 meters)		Groesbeck, Tex. (141 meters)		Royal Center, Ind. (225 meters)		Washington, D. C.[1] (7 meters)	
	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal
Surface	77	+5	69	+5	69	−1	83	+8	74	+8	62	−3
250	77	+5	70	+6			85	+9	74	+8	65	−4
500	80	+8	73	+6	68	−1	87	+9	72	+5	68	+2
750	81	+9	73	+5	68	+1	82	+5	72	+4	68	+3
1,000	82	+11	73	+4	68	+2	69	−3	74	+6	66	+3
1,250	79	+10	70	+1	70	+5	59	−8	74	+6	66	+2
1,500	74	+7	69	−1	69	+6	47	−15	73	+7	68	+5
2,000	64	+3	65	−5	63	+2	39	−15	65	+4	70	+5
2,500	49	−5	68	−2	64	+4	31	−18	64	+9	68	+8
3,000	42	−8	64	−3	62	+6	27	−19	59	+8	63	+5
3,500	36	−13	64	−1	60	+8			60	+15		
4,000	29	−19	62	+2	55	+7			72	+32		
4,500			62	+10	64	+17			72	+32		
5,000												

[1] Naval air station.

TABLE 1.—*Free-air temperatures, relative humidities, and vapor pressures during June, 1928*—Continued

VAPOR PRESSURE (*mb.*)

Altitude m. s. l. (meters)	Broken Arrow, Okla. (233 meters)		Due West, S. C. (217 meters)		Ellendale, N. Dak. (444 meters)		Groesbeck, Tex. (141 meters)		Royal Center, Ind. (225 meters)		Washington, D. C.[1] (7 meters)	
	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal
Surface	22.65	+0.03	21.28	+0.35	12.89	−2.40	24.82	+0.21	15.04	−2.28	21.40	+2.08
250	22.51	+0.09	20.93	+0.33			23.95	+0.20	14.71	−2.33	19.10	+1.54
500	20.70	+0.61	18.82	+0.37	12.46	−2.36	21.72	+0.01	13.16	−1.72	17.09	+1.60
750	19.16	+0.99	17.10	+0.27	11.16	−1.86	19.06	−0.56	12.06	−1.51	15.18	+1.28
1,000	17.87	+1.32	15.51	0.00	10.08	−1.65	15.66	−1.39	11.30	−1.19	13.29	+0.74
1,250	16.07	+1.25	13.52	−0.65	9.18	−1.42	12.93	−1.92	10.44	−1.02	11.87	+0.66
1,500	13.83	+0.70	12.00	−0.92	8.24	−1.19	9.92	−2.86	9.61	−0.66	10.87	+0.72
2,000	10.40	+0.38	9.20	−1.24	6.13	−1.47	6.93	−2.70	7.43	−0.47	8.72	+0.23
2,500	7.52	+0.14	8.12	−0.28	4.96	−1.30	4.56	−2.95	6.27	+0.51	6.84	+0.51
3,000	5.94	+0.35	6.41	−0.16	3.83	−1.00	2.94	−3.00	4.87	+0.58	5.03	+0.08
3,500	5.13	+0.63	5.19	+0.13	2.91	−0.93			4.27	+1.26		
4,000	4.49	+0.81	4.36	+0.60	2.09	−1.03			4.65	+2.47		
4,500			3.72	+1.02	1.89	−0.58			4.56	+2.74		
5,000												

TABLE 2.—*Free-air resultant winds (m. p. s.) during June, 1928*

Altitude M. S. L. (meters)	Broken Arrow, Okla. (233 meters)				Due West, S. C. (217 meters)				Ellendale, N. Dak. (444 meters)				Groesbeck, Tex. (141 meters)				Royal Center, Ind. (225 meters)				Washington, D. C. (34 meters)			
	Mean		Normal		Mean		Normal		Mean		Normal		Mean		Normal		Mean		Normal		Mean		Normal	
	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.
Surface	S. 5° W	3.7	S. 6° W	4.0	S. 76° W	3.8	S. 74° W	1.5	N. 3° W	0.5	N. 56° W	0.4	S. 15° W	5.3	S.	3.6	S. 16° W	1.7	S. 50° W	1.6	S. 67° W	0.4	N. 47° W	0.6
250	S. 5° W	3.8	S. 6° W	4.1	S. 77° W	4.4	S. 76° W	1.7					S. 14° W	7.3	S. 1° W	4.3	S. 23° W	1.8	S. 47° W	1.6	N. 72° W	1.9	N. 60° W	2.0
500	S. 4° W	4.4	S. 10° W	5.5	S. 69° W	6.4	S. 76° W	2.5	N. 57° E	0.3	N. 71° W	0.3	S. 17° W	11.1	S. 6° W	5.9	S. 28° W	3.9	S. 50° W	3.0	N. 63° W	3.7	N. 54° W	3.0
750	S. 5° W	4.6	S. 15° W	6.0	S. 74° W	7.3	S. 77° W	3.1	S. 4° W	0.9	S. 39° W	0.8	S. 21° W	12.4	S. 9° W	6.5	S. 25° W	5.0	S. 54° W	4.0	N. 73° W	4.2	N. 53° W	3.0
1,000	S. 18° W	4.8	S. 24° W	6.1	S. 74° W	8.4	S. 75° W	3.5	S. 27° W	1.3	S. 48° W	1.2	S. 27° W	12.8	S. 14° W	6.8	S. 42° W	5.0	S. 66° W	4.6	N. 74° W	5.2	N. 50° W	4.3
1,250	S. 28° W	5.3	S. 28° W	6.2	S. 77° W	9.2	S. 79° W	4.5	S. 43° W	1.3	S. 65° W	1.9	S. 31° W	12.4	S. 14° W	7.0	S. 51° W	5.6	S. 72° W	5.1				
1,500	S. 40° W	5.1	S. 33° W	6.2	S. 73° W	10.0	S. 77° W	5.6	S. 50° W	1.5	S. 69° W	2.3	S. 32° W	11.3	S. 16° W	6.5	S. 59° W	6.5	S. 80° W	5.2	N. 85° W	6.7	N. 57° W	6.0
2,000	S. 56° W	5.8	S. 39° W	6.3	S. 73° W	11.3	S. 81° W	7.5	S. 69° W	1.9	S. 78° W	3.4	S. 38° W	9.6	S. 17° W	6.0	S. 61° W	8.9	S. 83° W	7.5	S. 84° W	10.0	N. 70° W	7.3
2,500	S. 78° W	6.0	S. 43° W	6.3	S. 75° W	11.3	S. 80° W	8.0	N. 78° W	2.4	S. 83° W	5.1	S. 52° W	6.8	S. 15° W	5.3	S. 69° W	13.7	S. 81° W	9.6	S. 81° W	11.0	N. 72° W	6.2
3,000	N. 82° W	8.6	S. 48° W	6.5	S. 82° W	11.2	S. 85° W	9.2	N. 75° W	5.2	S. 89° W	7.2	S. 89° W	6.6	S. 16° W	5.2	S. 63° W	15.2	S. 84° W	11.1	S. 84° W	11.2	N. 82° W	8.9
3,500	N. 62° W	11.7	S. 54° W	6.8	S. 71° W	11.6	S. 83° W	10.3	S. 78° W	7.8	S. 89° W	9.2					S. 60° W	15.9	S. 82° W	11.5	S. 84° W	11.5	N. 74° W	9.3
4,000	N. 45° W	13.4	S. 68° W	7.6	W	9.0	S. 82° W	9.9	S. 84° W	10.7	N. 88° W	11.7					S. 50° W	10.1	N. 89° W	11.7	S. 83° W	10.3	N. 70° W	9.9
4,500					W	10.0	N. 72° W	12.5	N. 67° W	19.2	N. 79° W	13.6					S. 59° W	10.9	N. 80° W	10.0	N. 84° W	10.2	N. 68° W	9.8
5,000									W	23.0	N. 74° W	15.3									N. 83° W	11.0	N. 68° W	9.6

WEATHER IN THE UNITED STATES

THE WEATHER ELEMENTS

By P. C. DAY

GENERAL CONDITIONS

The weather of June, 1928, in the United States was notable in several respects:

The average atmospheric pressure was on the whole unusually low, though individual cyclones were without decidedly deep centers; the average temperature was likewise unusually low, particularly over the eastern two-thirds, the month being the coolest of record for June in a few instances and much similar to June, 1927, another unusually cool month. Rainfall was frequent and at times unusually heavy over the eastern two-thirds of the country; many localities had monthly amounts far above the normal for June, a number had amounts in excess of those for any previous June, and a few in excess of the greatest previously reported in any month; while the number of rainy days and amounts of cloudiness were in many instances equal to or in excess of those for any previous June. On the other hand, a few sections of the far Southwest had almost continuous sunshine, though the temperatures were not unseasonably high.

PRESSURE AND WINDS

While cyclonic conditions persisted with unusual frequency throughout the month over central and eastern districts, the barometric depressions were rather weak and confined to fairly short paths, but precipitation was frequently heavy over large areas.

A depression that appeared over the southern Rocky Mountains on the morning of the 3d became of considerable importance within the following 24 hours and during the 5th and 6th extended its influence over nearly all districts from the Mississippi River eastward. Heavy rains attended this depression in the Gulf and Atlantic Coast States, nearly 10 inches falling at Montgomery, Ala., during the 3d to 6th, and even larger amounts at some other points in that locality.

A cyclone of only moderate strength, passing eastward over the Northern States from the Dakotas to the Great Lakes and New England from the 7th to 10th, with an extension southward into the Mississippi Valley, brought widespread rains in portions of the Central and Northern States of the area covered, with heavy falls in a few localities.

On the morning of the 11th low pressure developed over the central Rocky Mountain region and during the following 48 hours passed to the northward of the Great Lakes attended by important precipitation over many portions of the central valleys and even into the Gulf States.

During the latter part of the second decade and the early part of the third a series of low-pressure areas passed over the central valleys, usually advancing northeast-

ward, and widespread rains, frequently of the thunderstorm type attended by hail and wind, were of frequent occurrence over wide areas.

The last few days of the month brought important precipitation from the middle plains eastward to the Atlantic coast, heavy falls occurring locally in the lower Missouri, middle Mississippi and Ohio Valleys.

Anticyclones were unimportant and mainly had little influence on the weather of the month, the generally cool conditions being largely due to unusual cloudiness lowering the daytime temperatures.

Local storms of more or less violent nature prevailed in all periods of the month and occurred at some time locally in nearly all parts of the country from the Rocky Mountains eastward, though most numerous in the eastern Great Plains and Mississippi Valley where heavy damage resulted locally.

A list of the more important storms of the month, with details as to loss of life, damage to property, etc., appears as usual at the end of this section.

The general distribution of the average monthly atmospheric pressure and prevailing directions of the winds appear on Chart VI and the departures from the monthly normals and changes from the preceding month on the insets to Charts II and III.

TEMPERATURE

While the temperatures were mainly continuously low for June, there were no important cold periods and no serious damage to vegetation resulted therefrom save that progress was materially delayed and most crops were appreciably later than usual at the close of the month. At a number of points the average daily temperatures save on one or two dates did not rise above normal during the entire month. This was particularly the case with regard to the daytime temperatures which did not rise to the usual extent due to frequent cloudy and rainy conditions.

The several weeks of the month were uniformly cooler than normal over nearly all central and northern districts and the month as a whole had deficient temperature in all parts of the country save for local small excesses along the south Atlantic coast, from central Texas westward to southern California, and locally in the Pacific Coast States. Over the Missouri, Mississippi, and Ohio Valleys the average temperatures ranged from 2° to 6° below normal, a few points in this general region having the lowest June temperatures of record. Elsewhere the averages were moderately deficient, save as indicated above.

The highest temperatures of the month were experienced mainly during the middle part of the first decade over the Southwestern States, about the middle of the month over the North Atlantic States, from the 18th to 21st in the Ohio Valley and Gulf States and near-by areas, and during the closing half of the third decade over the Northwest. The maximum temperature on the 21st at Charlotte, N. C., 98°, was the highest recorded at that place during June in more than 50 years.

The highest reported temperature was 120° in southern California and maximum temperatures above 100° were reported from localities in most of the Southern States and in the lower elevations from the Rocky Mountains westward. Over a few States in the Lake region the temperatures did not rise as high as 90° at any time.

The lowest temperatures were experienced mainly during the first decade from Washington and Oregon east and southeast to the Atlantic coast, save in the Northeastern States, where they occurred in the first few days of the second decade, during which time the minimum temperatures were reported also from the Southwest.

Freezing temperatures occurred at exposed points in the Mountain States, the lowest reported, 17°, occurring in the mountains of Colorado, and temperatures were below 32° at exposed points in all the Western Mountain States and along the entire northern border.

PRECIPITATION

As stated elsewhere, June was a remarkably wet month over practically all parts of the country from the Rocky Mountains eastward, all States in this area, save Minnesota, having averages above the normal. For most States from the Plains eastward to the Appalachian Mountains and in the lower Mississippi Valley the average monthly amounts were far in excess of the normal, in some cases more than twice as much, and individual localities had frequently three or four times the station normal.

The precipitation was rather uniformly distributed during the various portions of the month over nearly the entire area referred to above, so that no important crop areas suffered from lack of soil moisture though many had far too much, which greatly interfered with planting, germination, and cultivation.

The greatest fall for the month was 22 inches at Jackson, Mo., more than five times the June normal for the station, and amounts from 15 to 20 inches were reported from numerous stations in the States of heaviest precipitation.

Quite reverse conditions were reported from the Pacific Coast States and from central Texas westward, where the monthly precipitation in practically all sections was less than normal, though June is a month with usually light precipitation in all parts of this area.

SNOWFALL

As is usual in June, snow was confined mainly to the higher elevations in the western Mountain States and only scattered amounts were reported from these. The heaviest fall reported was 20 inches in Wyoming, and amounts up to 12 inches were measured in Colorado, in the Yellowstone Park region, and in near-by areas of western Montana, and locally in Nevada. No measurable snow was reported from the Lake region or from the mountains of New York or New England.

RELATIVE HUMIDITY

Despite the general coolness of the month, the frequency of precipitation, and the general resulting cloudiness, the average percentages of relative humidity were not materially higher than usual save in a few localities, mainly in the upper Missouri Valley where they ranged from 6 to 12 per cent above normal, and from the Ohio Valley to New England where they were from 5 to 10 per cent above. West of the Rocky Mountains and from central Texas to Arizona the relative humidity was generally less than normal, but the departures were usually unimportant save in extreme western Texas.

The general absence of extremely low humidity in the forest regions of the West greatly reduced the hazard of forest fires which were comparatively infrequent.

SUNSHINE AND CLOUDINESS

In the Great Valley of California and the near-by areas of Arizona and other parts of the far Southwest the percentages of sunshine were high, reaching practically 100 at many points. Otherwise sunshine was usually distinctly less than normal, averaging not more than 20 to 30 per cent of the possible over large areas in the Ohio Valley and near-by areas and ranging up to 30 or 40 per cent in many sections from the Missouri Valley eastward to New England and in the central portions of the Gulf States.